

REMARKS

By this amendment, applicants have amended pages 6 and 8 of the specification to include therein the subject matter previously disclosed in original claims 3, 4 and 11 of parent application Serial No. 10/216,720. Since the contents of the parent application have been incorporated by reference (see the preliminary amendment filed September 10, 2003 and Box 18 of applicants' Utility Patent Application Transmittal Form), the foregoing amendments do not introduce new matter to the application.

Applicants have amended the claims to more clearly define their invention. In particular, applicants have amended claims 4 and 7 to indicate that the multilayer film includes an insulation layer and either polycrystalline silicon or amorphous silicon. Claim 10 has been canceled and claim 11 amended to recite that the etching step used to form upper end portions of the trench tapered shape uses a mixed gas including CHF₃ and HBr, while the etching step to form the main trench portion uses a mixed gas including Cl₂, O₂ and HBr. Applicants have also added dependent claims 12 - 14 to define further aspects of the invention.

Applicants have also amended the title to read --Manufacturing Method For Creating A Trench On A Semiconductor Device-- as required by the Examiner in numbered section 1 of the office action.

Claims 4 - 9 and 11 stand rejected under 35 USC 102(b) as allegedly being anticipated by United States Patent No. 6,235,643 to Mui et al. Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to a method for manufacturing a semiconductor device. According to claims 4 - 9, 13 and 14, the method includes forming a multilayer film including an insulation layer and either polycrystalline silicon or

amorphous silicon on the semiconductor substrate, forming a resist mask by patterning a resist applied on the multilayer film, etching the multilayer film using the resist mask, removing the resist mask after completing the etching, and processing the semiconductor substrate to create a trench, having an upper end portion, utilizing the multilayer film from which the resist has been removed as a mask. The step of processing the semiconductor substrate includes providing a roundness or round-off processing to the upper end portion of the trench.

The patent to Mui et al discloses a method for etching a trench having rounded top and bottom corners in a silicon substrate. The Examiner refers to Figures 4A - 4D and 5A-5D, especially Figures 5A - 5D in which an oxide layer 504 and a silicon nitride hard mask 506 having a built-up extension 508 upon sidewall 507 are used to etch the trench in silicon substrate 502. However, the Mui et al patent does not disclose the method set forth in claims 4 - 9 including the use of a multilayer film including an insulation layer and either polycrystalline silicon or amorphous silicon, as presently claimed. Accordingly, the Mui et al patent does not disclose the presently claimed invention, as set forth in claims 4 - 9, 13 and 14.

Claims 11 and 12 are directed to a method for manufacturing semiconductor device, including etching the semiconductor substrate utilizing a mask layer using a mixed gas including CHF₃ and HBr, to form upper end portions of a trench in tapered shape, and etching the semiconductor substrate utilizing the mask using a mixed gas including Cl₂, O₂ and HBr to form a main trench portion. These features are neither disclosed nor suggested by Mui et al. Accordingly, claims 11 and 12 are not disclosed by Mui et al.

For the foregoing reasons, claims 4 - 9 and 11 - 14 are not disclosed by Mui et al.

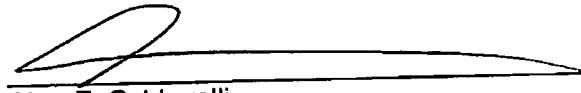
In view of the cancellation of claim 10, the rejection of this claim in numbered section 8 of the office action is moot.

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 41969CX1), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Alan E. Schlavelli
Registration No. 32,087

AES/jla
(703) 312-6600